# Sustainable Preservation

An addendum to Building with Nantucket in Mind

## Acknowledgments

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# Introduction

The primary intent of this document is to provide assistance to Nantucket's building owners and construction professionals who wish to incorporate the concepts and practices of sustainability into their structures, while maintaining the historic integrity of the individual buildings, and through them, the overall character of the island. With the help of these guidelines, the concepts of *minimal intervention, reversibility,* and *conservation*[*] can be incorporated into all work on Nantucket. This in turn, will help ensure that the island maintains the sense of place enjoyed by locals and tourists alike while still achieving the goal of energy efficiency.

## Context

Through the efforts of local nonprofit, Sustainable Nantucket, in 2008 the Town of Nantucket joined the International Council of Local Environmental Initiatives (ICLEI) Cities for Climate Protection (CCP) Campaign. As part of this Campaign, a rough draft of a Climate Protection Action Plan for the Town of Nantucket was recently completed by Carrie Petrik, a Clear Air-Cool Planet Climate Fellow working for Sustainable Nantucket. A key objective of this Plan is to reduce Nantucket's carbon footprint[*] by approximately 22 percent by 2020. This goal can only be achieved if every possible action is taken, including making the island's nearly 13,000 buildings more energy efficient.

During a Carbon Emissions Inventory of the island performed by Sustainable Nantucket in 2008, it was found that roughly 30 percent of the local carbon emissions can be attributed to day-to-day building operations.[1] Because of Nantucket's well-preserved heritage and its citizen's growing interest in energy efficiency, it is necessary to examine the relationship between sustainability and preservation. Consequently, this set of guidelines has been written to help clarify some of the more complicated issues unique to historic areas.

## Inherent Energy Efficiency

Close examination of Nantucket's traditional buildings reveals the potential for a number of techniques for achieving energy efficiency that are often forgotten today. For example, many buildings were designed around one or more masonry chimneys, responding to the need to keep buildings warm during the winter months. Another technique was the use of low ceilings with smaller rooms separated by interior walls and doors. This interior layout allowed a single fire to heat the necessary rooms while leaving the unused rooms colder. The siting of buildings and their fenestration[*] was also an early

[*] **Minimum intervention** is the principle that the less change or alteration done to a historic resource the more integrity that resource retains. **Reversibility** is the principle that nothing should be done to a historic resource that can cannot be undone or reversed without permanent damage to the resource. **Conservation** the careful utilization of a natural resource in order to prevent depletion.

[*] **Carbon Footprint** is the total set of GHG (greenhouse gas) emissions caused directly and indirectly by an individual, organization, event or product.

[*] **Fenestration** is the arrangement and design of windows in a building.

design choice, made in response to Nantucket's environment. Traditionally southern walls have more windows and the openings are typically larger, in order to take better advantage of the solar-heat gain available during the cooler months. Conversely, a building's northern walls typically had the least amount of glass (and sometimes wall area) due to the harsh winter winds. Operable windows, specifically double hung windows, were used for passive cooling* as were shutters and interior drapes. Appropriately placed landscaping was also employed for windbreaks and shading. These traditional techniques can and should be rediscovered and utilized in order to reduce the energy and fuel demands of mechanical heating and cooling equipment.

### Embodied Energy

A frequently overlooked aspect of energy in existing buildings is their embodied energy. Embodied energy is the energy required to extract the raw materials, and manufacture, transport, and install a building product.[2] An existing building represents all of the fossil fuel needed to construct the building originally -- energy that is wasted when a functional building is demolished. In a recent study conducted in the United Kingdom, it was determined that an energy-efficient new home would take between 35 and 50 years to recover the energy expended in constructing it.[3] Of course, embodied energy is not simply limited to exterior materials, and must also be considered when dealing with the interior fabric of existing buildings, especially those with historic value. Recognizing a building's existing material as valuable is the first and most significant step towards becoming energy efficient.

## Energy Efficiency in Historic Buildings

These conservation measures include a broad spectrum of methods, ranging from low-cost and easy solutions like light bulb replacement, to more extensive solutions such as upgrading appliances and mechanical equipment. Simply reducing the constant need for electricity through conservation, for example, may allow a building owner to install smaller amounts of renewable energy equipment. It is recommended that building owners start exploring the many options for reducing energy consumption at the U.S. Department of Energy's *Energy Efficiency and Renewable Energy* website listed in the links below. However, building owners must keep in mind that some of these tips may not be appropriate for historic buildings. Those interested in integrating sustainable technologies into their structures should always consider the historic integrity of the building before applying some of the more invasive techniques, such as window replacement or insulation. Nantucket's building owners can find sustainability tips that are specifically geared

**Minimal intervention** is the principle that states that the less change or alteration done to a historic resource, the greater the integrity that resource retains. It is used nationally to promote responsible preservation practices.

* **Passive cooling** refers technologies or design features used to cool buildings without power consumption.

towards historic structures at the website of the National Trust for Historic Preservation, also listed below.

While not all energy efficient techniques can be used on historic structures, there are a number of important concepts regarding both sustainability and preservation that building owners and building professionals must consider. *Minimal intervention* and *reversibility*, as well as *conservation*, mentioned previously, are all important concepts in achieving the ultimate goals of both preservation and sustainability.[4] *Minimal intervention* often surfaces when discussing the preservation of historic buildings. The benefit of utilizing the principles of minimum intervention through the retention of existing (particularly character defining[*]) fabric is in the reduction of construction debris, the retention of embodied energy, and the preservation of historic building features. Another concept which shares similar benefits, and is often mentioned with regard to historic structures, is that of *reversibility*. It is especially important to utilize these principles when creating your renewable energy infrastructure. There also are a number of renewable energy production techniques that, once installed, have little or no visual impact on the property where they are employed. Interested applicants are encouraged to consider all of the available options before deciding on any particular course of action.

> **Reversibility** is the principle that nothing should be done to the historic fabric of a structure that cannot be undone or reversed without permanent damage to said historic resource.

It is the intention that these guidelines be updated periodically in order to better reflect advances in sustainable technologies or methods as the need arises, and that the guidelines in no way hinder an applicant from presenting new and creative solutions for discussion. It therefore remains the building owners' responsibility to think creatively about their needs and to use the HDC and its staff as a resource in helping Nantucket become more energy efficient.

### Important Energy Conservation Links

Department of Energy: www.energysavers.gov
National Trust for Historic Preservation:
http://www.preservationnation.org/issues/sustainability/

[*] **Character-defining features** include the overall shape of the building, its materials, craftsmanship, decorative details, interior spaces and features, as well as the various aspects of its site and environment.

# Windows and Doors

## Introduction

The Nantucket Historic District Commission encourages the protection and restoration of historic wood windows for all Nantucket buildings. The restoration of existing windows is important because the retention of this fabric helps to preserve an irreplaceable cultural resource, and because restoration is an environmentally responsible alternative to replacement. It is crucial to note that when historic doors and windows have been properly sealed against air infiltration* and augmented with storm-windows, they meet a number of important sustainability goals including the reduction of waste, reuse of existing materials, and increased energy efficiency. While homeowners often are convinced that replacement windows may solve their energy and renovation problems, this section will outline other cost effective steps which will increase the efficiency of older windows while also maintaining historic integrity.

**Figure 1: Wood Screens**

It also should be noted that heat loss through windows is not a problem unique to historic buildings; windows in new construction often have the same issues due to poor installation or function of the windows. Reducing air infiltration should be the first priority of any preservation-retrofitting plan.

### Repair Don't Replace

Preserving a building's existing windows not only conserves their embodied energy*, but also eliminates the need to expend more energy extracting, manufacturing, transporting, and installing the replacement window. Typically made of superior old-growth wood, traditional windows can be restored, even with deferred maintenance. The restoration of these existing wood windows will help reduce landfill waste, approximately 40 percent of which is composed of construction debris.[5]

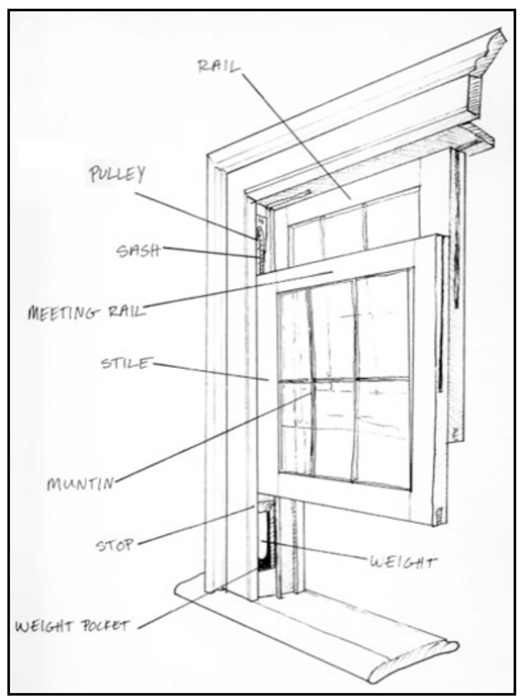


**Figure 2: Double-hung window**

In the building industry "replacement window" can mean two distinct things. One is the replacement of the sash of a window, leaving the frame and sill. The other refers to the replacement of an entire window including the frame and sash. On Nantucket, if an original window has degraded beyond repair or if it is

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* **Air infiltration** is the uncontrolled inward leakage of outdoor air through cracks, interstices, and other unintentional openings of a building, caused by the pressure effects of the wind and/or stack effect.

* **Embodied energy** – The energy required to extract the raw materials, manufacture, transport, and install a building product.

determined that a new window is needed, it is recommended that wood replacement sashes be used. In general the HDC prefers the use of wood replacement sashes or windows. This is because vinyl and aluminum-clad windows are aesthetically inappropriate within the Old Historic District, Siasconset Old Historic District and on contributing structures. Vinyl and aluminum windows are more energy intensive to produce, have a shorter expected life-span than wood windows, and may degrade or corrode in Nantucket's climate.[6]

## Windows & Sustainability in Historic Design

In many ways historic structures are inherently sustainable, whether through their use or their original design. Due to Nantucket's variable weather and environment, buildings here traditionally have an overall window area that makes up less than 20 percent of the overall wall area.[7] Windows typically are moderate in size and tend to be more prominent on the south-facing wall. South-facing windows maximize solar-heat gain in the winter and can be opened to promote air circulation in the summer. This traditional fenestration* balances both the heat loss in winter and the need for light and cooling in the summer.

### *Non-invasive Techniques*

Many energy efficiency techniques recommended to historic building owners do not require any alteration to historic buildings. Some of these techniques include: the use of operable window shutters and awnings (when historically accurate for the structure); interior hangings and curtains to help insulate in the winter and stop radiant heat gain in the summer; and the deliberate use of landscaping to block the wind in the winter and provide shade to the building in the summer. These simple techniques will reduce energy consumption through a decreased need for heating and air-conditioning.

## Storm Windows

A storm window is a supplementary window sash that adds a layer of glass to an existing window. Storm windows are the least invasive and most appropriate way to increase the energy efficiency of historic windows. All storm windows enclose a thermal air space that approximately cuts heat loss in half.[8] Exterior storm windows also protect historic windows from the elements prolonging the life of windows while lowering maintenance costs.[9] A single-glazed, traditional window combined with a "low-emissivity"* coated storm window can have a similar "U-value"* as a new double-paned window.[10] However, proper installation of storm windows is an important factor when assessing their performance. Owners of contributing historic structures should consult

**Figure 3: Exterior storm window residential application**

* **Fenestration** is the arrangement and design of windows in a building.

* **Low-emissivity coatings** reduce heat flow by slowing the rate at which heat is emitted from the glass.

* **U-Value** or Thermal transmittance (Btu/hr-ft-°F) is the rate of heat flow per unit time per unit area per degree temperature differential. Essentially a measure of thermal transmission through window materials and the boundary air films. U-value is the inverse of R-value.

with the HDC staff when choosing storm windows in order to determine the most energy efficient combination that is appropriate for the building.

For exterior applications, the use of wooden storm windows is recommended. These not only are more historically accurate than metal storm windows, but they also require less energy to produce and can endure longer than some metal storm windows in Nantucket's climate. In some instances the use of metal storms may be acceptable as long as they do not obscure window details. Single-track metal storms that fit within the window trim tend to have less visual impact and are more durable than triple-track storm windows. The use of singe-track metal storm windows is preferred over the replacement of, or installation of, triple-track storm windows. Again the building owner may want to consult the HDC staff before making any final decisions.

**Figure 4: Exterior storm door**

## Storm Doors

Storm doors come in a variety of styles. Like storm windows storm doors create an intermediate thermal layer of air. Wood storm doors are preferable and must match the design of the building. Storm doors decrease air infiltration around the door opening, and are especially useful when the door has windows that may be difficult to weatherize in any other way.

## Weatherization

### *Windows*

There are many non-invasive techniques that can be used to weatherize existing windows, including the passive techniques mentioned earlier. Nantucket already has a number of established weatherization practices that may be preferable to most current, modern techniques. One such technique is the proper utilization of sash locks, when appropriate. A lock that closes properly forces the opposing parts of a window together preventing air infiltration. The HDC staff may be able to assist building-owners and contractors in utilizing non-invasive and traditional techniques.

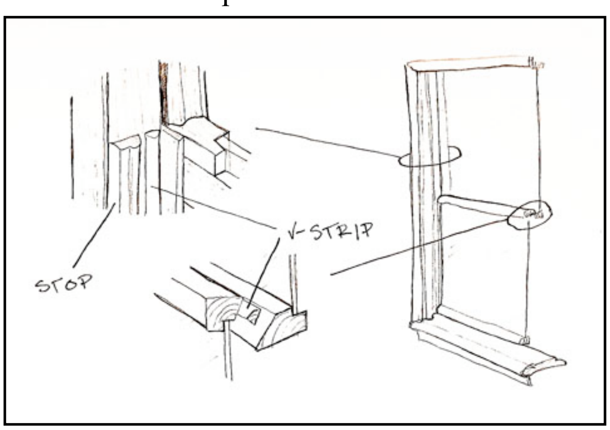


**Figure 5: Window weather-stripping**

Where drafts occur in and around a window a building owner may wish to consider weather-stripping.[*] This easy, and typically reversible, form of weatherization can be used to help eliminate air infiltration. Each window style requires a slightly different weather-stripping technique. If the building is considered contributing, an owner may wish to consult the HDC staff for more detailed information about appropriate weather-stripping. Typically, the areas most prone to air infiltration, especially in a double hung

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[*] **Weather-stripping** is a narrow strip of metal, wood, rubber, or the like placed between a door or window sash and its frame to exclude rain, wind, etc.

windows, are where the sash and the jamb meet, and at the meeting rails. The insertion of seasonal weather-stripping* can help to limit these drafts. In double hung windows that have a weight and pulley system the weight pocket can be another source of air infiltration. The two most effective ways to seal this area are either plugging the opening with a piece of solid foam or purchasing a plastic cover for the pulley specifically designed to minimize the opening while allowing the mechanism to work. The Department of Energy has a number of additional weather-stripping suggestions that can be found on their website.[11]

### *Doors*

With doors, as with windows, it is important to determine if there is an existing, historic form of weatherization before employing modern solutions. If it is determined appropriate, the basic weather-stripping around exterior doors will create a tighter fit between the door and its frame, reducing air infiltration by as much as 20%.[12] Those techniques that have minimal impact on the exterior of the door are preferred. Therefore weather-stripping between the door and the jamb is recommended, as is an interior door sweep.

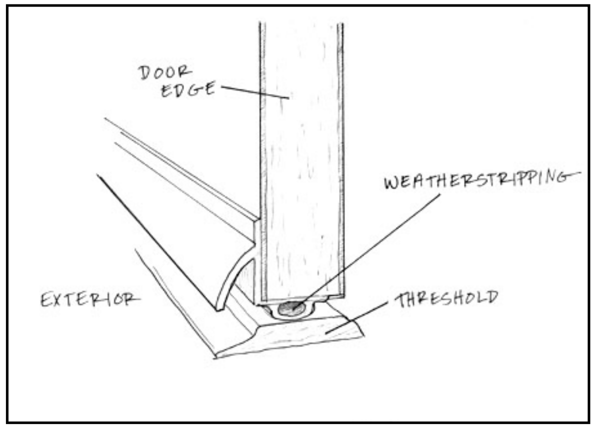

**Figure 6: Door weather-stripping**

### New Construction

Traditional fenestration is encouraged for all buildings on the island. The use of double-paned windows is encouraged on non-contributing buildings outside the old historic districts. True divided light wood windows are preferred in all new construction. Single-glazed true-divided light windows are generally approved on buildings within the old historic districts and on contributing buildings. Any new window should be installed with proper weatherization techniques.

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* **Seasonal weather-stripping** refers to weather-stripping that is removed during the warmer months. It can be made of a number of materials, most typically felt, neoprene, or foam.

## Windows and Doors Guidelines

### Inside the Historic Districts and Contributing Structures

*Existing Buildings:*

- Historic windows should be preserved and restored, taking advantage of the embodied energy represented in the existing material.
- Wood storm windows and doors are encouraged.
- Sash locks should be repaired or installed.
- If traditional weather-stripping exists it should be replaced in kind. If it does not then weather-stripping may be installed where needed.
- Passive energy saving measures such as shutters and awnings (when historically appropriate) as well as the use of curtains are highly encouraged.

*New construction and additions:*

- Traditional fenestration proportions (approximately 25% of overall wall area) should be considered in the design stages.
- Single-paned wooden windows are required and should be properly weatherized during installation.
- Storm windows and doors are encouraged.
- While wood storm windows are encouraged metal storm windows are acceptable on secondary facades if they are not visible from the publicly traveled way.
- Passive energy saving measures such as shutters and curtains are highly encouraged.
- Window and doorframes may be caulked on the interior. Care should be taken to choose a caulk that is chemically compatible with interior surfaces.

### **Outside the Historic Districts** (if not a contributing structure)

*Existing Buildings:*

- Wooden true divided-light (those with true muntins) are preferred. Vinyl or aluminum windows are discouraged.
- Windows and doors should be retrofitted with appropriate weather-stripping where needed.
- Storm windows and doors should be installed. Wood storm windows and doors are preferable but metal options may be acceptable.

*New construction and additions:*

- Traditional fenestration proportions (approximately 20 percent of overall wall area) should be considered in the design stages.
- Double and triple-paned windows are encouraged. Wooden true divided-light (those with true muntins) are preferred. Wood windows with applied muntins may be considered but

vinyl or aluminum windows are discouraged.

- Windows and doors should be installed using appropriate weatherization techniques including weather-stripping and caulking.
- Storm doors should be installed. Wood storm doors are preferable but metal may be acceptable.

# Solar Technologies

## Photovoltaic Systems

At the time of publication of this addendum, there are only two prevailing types of photovoltaic (PV) collectors: photovoltaic panels and building integrated photovoltaics (BIPV). Both systems exist to convert the sun's energy into electricity. BIPV can be considered because it typically makes less of a visual impact on a structure. Unfortunately, this technology is currently not as efficient as photovoltaic panels. The following guidelines should therefore be applied to any style of PV system that has been deemed appropriate according to each building owner's unique circumstances, keeping in mind that it is always preferable to use the least visible technology.

## Solar Thermal Systems

Solar Thermal refers to any system that harnesses the power of the sun to heat a liquid medium for specific applications such as domestic hot water, space heating, and pool heating. As of the publication of this addendum, there are a number of different technologies that are designed to help lower energy bills by utilizing solar thermal systems. Some technologies are available that allow collectors to be hidden entirely within the roof structure, and should be considered (especially for new construction) because of their minimal visibility. However, this guideline will primarily focus on technologies incorporating collectors (whether evacuated tubes or panels) that require direct sunlight.

**Figure 7: Photovoltaic Ground Array**

## Placement & Design of Photovoltaic and Solar Thermal Systems

The utilization of "energy producing" technologies, such as photovoltaics and solar thermal, should only be considered after every effort to reduce a structure's energy consumption have been made. It is appropriate to consider placement of PV or solar thermal arrays elsewhere on the property before considering mounting this technology onto the primary structure. This is especially important in Nantucket's Old Historic District, in Siasconset's Old Historic District, on contributing buildings or in historically important landscapes, where the use of this technology may have a higher degree of visual impact. When determining where to place PV or solar thermal collectors, it is important to attempt to minimize any adverse effects upon a structure's existing fabric, as well as to mitigate the visual impact these panels and all of their supplementary equipment may have upon the surrounding area. As eventual wearing out of parts is expected with these technologies it is important to note that equipment must be replaced with like kind. The HDC will consider any replacement that is not exactly like the original to be a change in design, which requires a new application of appropriateness.[13]

**Recommended**

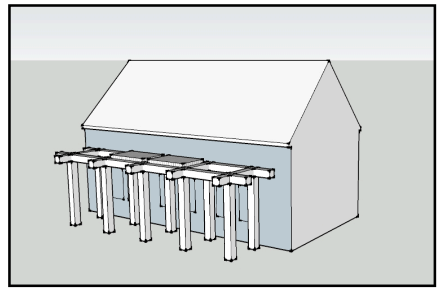

**Figure 8: Solar panels incorporated into trellis**

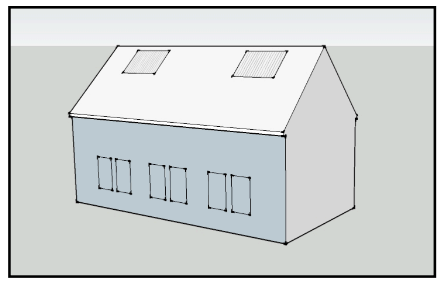

**Figure 11: Panels placed on upper 2/3 of roof and aligned with windows.**

**Not Recommended**

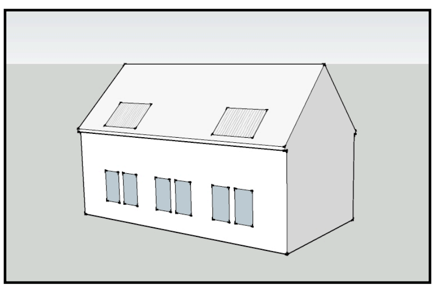

**Figure 10: Panels on lower 2/3 of roof.**

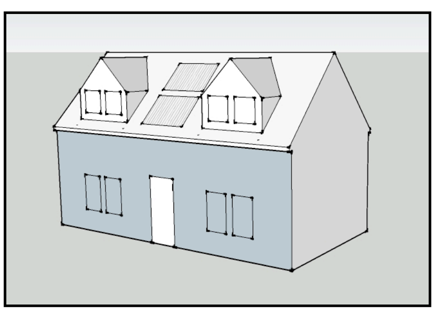

**Figure 9: Panels located on primary facade and highly visible.**

When beginning an investigation regarding where best to incorporate PV or solar thermal collectors onto a property, the owner of any structure should always fully consider the principles of *minimum intervention* and *reversibility.*[*] The entire site must be fully examined for its potential to accommodate these technologies effectively. The most preferable placements for these technologies will have no physical impact on the primary structure and have negligible visual impact upon the site as a whole. Therefore whenever possible, the least visible installation of ground arrays is preferred. If it is necessary for an array to be placed on a structure, it is encouraged that the array to be placed somewhere other than on the primary structure. For example, placement on any non-contributing ancillary structures (such as detached garages or sheds) would stand a greater chance of approval than an installation proposed only on the primary

[*] **Minimum intervention** is the principle that the less change or alteration done to a historic resource the more integrity that resource retains. **Reversibility** is the principle that nothing should be done to a historic resource that can cannot be undone or reversed without permanent damage to the resource.

building.[*] The creative placement of PV and solar thermal collectors may be encouraged, if such placement limits any adverse impact of the array (e.g. in an existing skylight).

Because the sloped roofs typical of Nantucket's built environment are such a character-defining feature of the island's cultural heritage, rooftop equipment installations should be carefully designed and positioned on any roof. The basic elements of design to consider are: balance, proportion, color, rhythm, and scale. Additionally, PV and solar thermal collectors should be kept on the same plane as the roof, with the color of the panels in keeping with the surrounding roofing materials.

**Recommended**

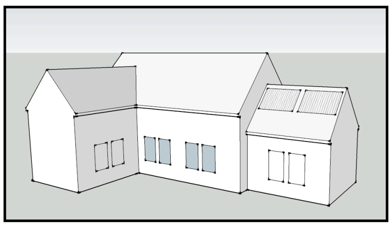

**Figure 12: Panels on secondary massing**

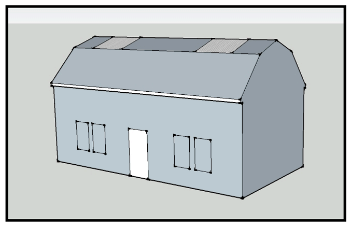

**Figure 13: Panels placed with minimal visual impact.**

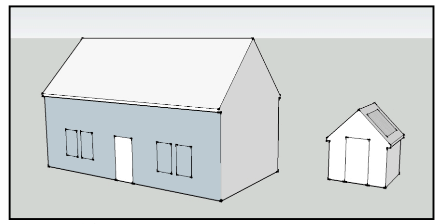

**Figure 14: Panel placed on non-contributing ancillary structure**

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[*] A **non-contributing structure** is defined as a building, which is not an intrusion but does not add to a historic district's sense of time, place and historic development.

## Photovoltaic and Solar Thermal Guidelines

Applications for Photovoltaic and Solar Thermal systems in the Old Historic District, Siasconset Old Historic District, and those on contributing properties are likely to attract a higher level of scrutiny. This also is true for installations on contributing buildings, and where lack of vegetation makes an installation visible from surrounding areas.

*Existing Buildings and New Construction:*

- The least visible application of technologies and their supplementary equipment is recommended. If the array is located on the ground, appropriate screening may be necessary.
- Applications of these systems as a ground array or on non-contributing ancillary structures (as opposed to on the primary structure) are encouraged.
- The appropriateness of a photovoltaic or solar thermal system will be based upon the historic character and architectural significance of the individual structure and its relation to its surroundings.
- Photovoltaic and solar thermal installations need to be designed carefully and positioned to be in scale with the structure's roofline, while maintaining a balance, scale, proportion, and rhythm with other features of that elevation.
- Systems should be on the same plane as the roof with the color of the panels in keeping with the surrounding roofing materials.

*Recommended Application Materials:*

Applications for renewable energy systems should include materials adequate to describe the proposed equipment, the structure, and the surrounding area. These may often include:

- A sample of the product and supporting documentation if available.
- Photographs of the installation site and surrounding area.
- A scaled drawing of the proposed system including all supplementary equipment.
- If the system is being proposed on the primary structure the applicant should be prepared to discuss why placements with less visibility or less impact-were not used.

# Wind Energy Conversion Systems

## Introduction

Wind Energy Conversion Systems (WECS) share a link with traditional windmills. Consequently there exists an historical precedent for their use on Nantucket. As it pertains to this addendum, wind energy conversion systems are devices that convert kinetic wind energy into rotational energy to drive an electric generator.[14] This section is limited to the domestic utilization of WECS, these guidelines are not necessarily intended to refer to large-scale commercial or industrial applications.[15] At the start of any homeowner's investigation regarding where to best introduce WECS technology onto a property, the principles of *minimum intervention* and *reversibility*[*]should always be fully considered.

## Tower-Mounted

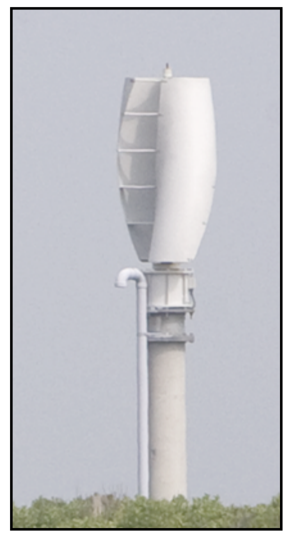


**Figure 15: Vertical WECS**

In order for a wind energy conversion system to be fully effective, they are often required to be considerably taller than the surrounding landscape. This high rate of visibility is a possible hindrance to the application of these technologies on Nantucket. When determining the most appropriate placement for this technology, it is crucial to take into account the view of the turbine from all publicly traveled ways its presence may affect. As a part of the review process, the adverse impact that the entire assembly could have upon the surrounding neighborhood may be considered. Those installations that have a lower degree of visual impact on or from the Old Historic Districts and contributing properties may be viewed more favorably. In order to minimize the visual impact of both the tower and turbine, the color of the assembly should be muted and without visible graphics. Ancillary structures, when required, should also be included in the application for review; both suitably designed and appropriately screened when necessary. In the event a wind turbine is abandoned, or fails to produce electricity for one year, the Nantucket building inspector may require the removal of the device.[16] The HDC may put a hold on issuing any new permits for properties where there is abandoned or failed technology that needs to be de-commissioned.

[*] **Minimum intervention** is the principle that the less change or alteration done to a historic resource the more integrity that resource retains. **Reversibility** is the principle that nothing should be done to a historic resource that can cannot be undone or reversed without permanent damage to the resource.

## Wind Energy Conversion Systems Guidelines

When determining the most appropriate placement for a wind energy conversion system, it is important to consider its impact on the surrounding neighborhood, especially those with historic significance.

*Tower mounted:*

- The potential impact of the turbine on the applicant's property as well as its potential impact on surrounding neighborhood, including setbacks and existing views, may be considered.
- The installation location having the least impact on the surrounding neighborhoods should be considered first.
- Ancillary structures, when required, should be included in the application for review and should be both suitably designed and appropriately screened, when necessary.
- The color of the turbine and tower should be muted.
- No graphics on the turbine or tower should be visible.

**Figure 16: Vertical WECS and photovoltaic array**

# Alternative Materials

As it pertains to these guidelines, the phrase *alternative materials* refers to any "green" or "sustainable" material that is intended as a substitute for traditional building materials. At this time alternative materials are not likely to be considered for use inside the Old Historic District, Siasconset Old Historic District, or on contributing buildings. However, building owners are encouraged to use sustainably-harvested lumber or reclaimed materials whenever possible. The HDC may only consider alternative materials utilized to replace wood detailing and roofing on new construction outside the Old Historic Districts.

These alternative materials should resemble traditional materials and should in no way be visually distracting. Appropriate alternative materials for milled lumber, such as composite or engineered lumber, must be a solid composite material consisting of wood fibers. To be deemed appropriate, composite or engineered lumber must be millable[*] and weather in a way that is similar to traditional lumber.

The Commission also may consider alternative roofing materials, however they must be fire-resistant shingles of rectangular design and limited to uniform tones of black, dark green, or gray of a value no lighter than typical weathered shingles elsewhere on Nantucket.[17]

## Alternative Material Guidelines

### *Trim and Miscellaneous Details:*

- Trim or detail elements made of alternative materials must be painted.
- Material must weather similarly to traditional lumber.
- Material must be millable.
- Alternative Materials are inappropriate inside the Old Historic District or Siasconset Old Historic District as well as on contributing buildings.

### *Exterior Wall Surfaces:*

White cedar shingles with a 5-inch exposure, and wooden clapboard with a 3 1/2-inch exposure are still the most appropriate wall surfaces. Building owners may want to investigate the use of wood that has been certified by the Forest Stewardship Council (FSC).[18]

[*] **Millable** or able to be shaped onsite.

## Rain Barrels

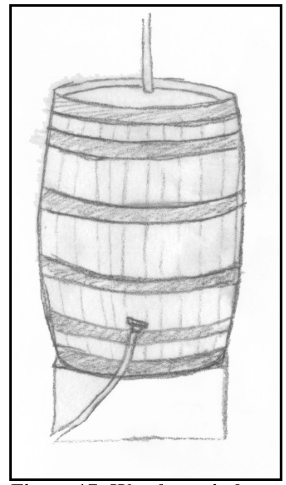


Figure 17: Wooden rain barrel

Rain barrels are above ground water storage systems that connect to gutter downspouts. In urban settings they are more often used as a source of fresh water for landscaping. The relationship between water and energy is not well publicized, however nationally approximately 3 percent of the nations electricity is used to sanitize water.[19] Although Nantucket currently has a plentiful supply of fresh water the Town's energy use can be greatly reduced if homeowners utilize captured rainwater in instances where potable water* is not required.

Currently barrels can be made of a variety of materials including wood and plastic. The HDC considers wood, as traditional material, more appropriate in general on Nantucket. In order to minimize the visual impact of rain barrels they should be placed on the rear of a building and, if necessary, be appropriately screened.

### Rain Barrel Guidelines

- Rain barrels should not be visibly intrusive.
- Wooden barrels are preferred.
- If the rain barrel is visible from the traveled way it may need to be appropriately screened.

Figure 18: Permeable pavers - shell, brick, and cobblestones.

## Permeable Pavers

Permeable pavers typically are used as a less energy intensive alternative to asphalt or concrete. Traditional styles of permeable pavers can be found throughout the island and include cobblestones, brick, gravel, and shell. While there are a number of modern pavers that serve the same function the applicant should consider traditional solutions first. However, some modern permeable pavers are designed to promote the growth of vegetation. The HDC recommends this style where non-traditional options are appropriate.

* **Potable water** is water which is fit for consumption by humans and animals.

## Glossary

**Air infiltration** - Uncontrolled inward leakage of outdoor air through cracks, interstices, and other unintentional openings of a building, caused by the pressure effects of the wind and/or the movement of air through chimneys, flue gas stacks, or other containers driven by the difference in air temperature.

**Carbon emissions** - Polluting carbon substances released into atmosphere.

**Carbon Footprint** - The total set of GHG (greenhouse gas) emissions caused directly and indirectly by an individual, organization, event or product.

**Character-defining features** - Include the overall shape of the building, its materials, craftsmanship, decorative details, interior spaces and features, as well as the various aspects of its site and environment.

**Contributing structure** -A structure judged to add to the historic district's sense of time, place and historic development.

**Conservation -** The careful utilization of a natural resource in order to prevent depletion.

**Embodied energy** - The energy required to extract the raw materials, manufacture, transport, and install a building product.

**Fabric** - The basic elements making up a building.

**Fenestration** - The arrangement and design of windows in a building.

**Low-emissivity coatings** - Coatings that reduce heat flow by slowing the rate at which heat is emitted from the glass.

**Millable**- Able to be shaped onsite.

**Minimum intervention** - The principle that the less change or alteration done to a historic resource the more integrity that resource retains.

**Non-contributing structure** - A building which is not an intrusion but does not add to a historic district's sense of time, place and historic development.

**Passive cooling** -Technologies or design features used to cool buildings without power consumption.

**Potable water** - Water which is fit for consumption by humans and animals.

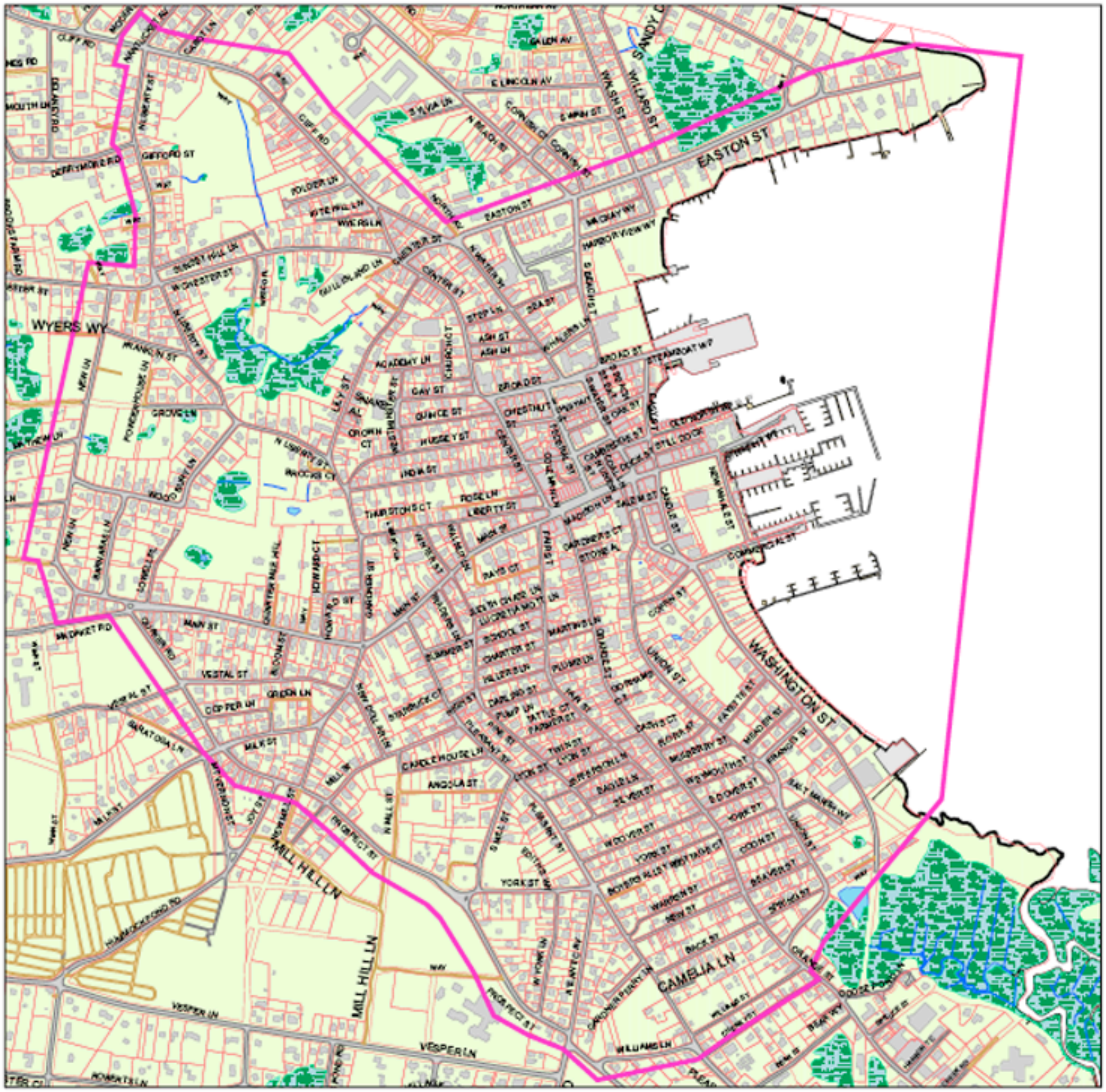
**Reversibility** - The principle that nothing should be done to a historic resource that cannot be undone or reversed without permanent damage to the resource.

**Significant Structure** - Any building on the island 50 years old or older which is either: 1) associated with one or more historic figures or events, or with a broad island architectural, cultural, political, economic or social history; or 2) is historically or architecturally significant whether by itself or in context with other buildings, in terms of period, style, method of building construction, or association with a noted architect or builder.

**U-Value** *or Thermal transmittance (Btu/hr-ft-°F)* - The rate of heat flow per unit time per unit area per degree temperature differential. Essentially a measure of thermal transmission through window materials and the boundary air films. U-value is the inverse of R-value.

**Weatherization** - To make (a house or other building) secure against cold or stormy weather, as by adding insulation, siding, and storm windows.

**Weather-stripping** - a narrow strip of metal, wood, rubber, or the like placed between a door or window sash and its frame to exclude rain, wind, etc.




# Nantucket Historic District Commission (HDC)

## Old Historic District

# Core Area

0 500 1,000 Feet

1 inch equals 600 feet

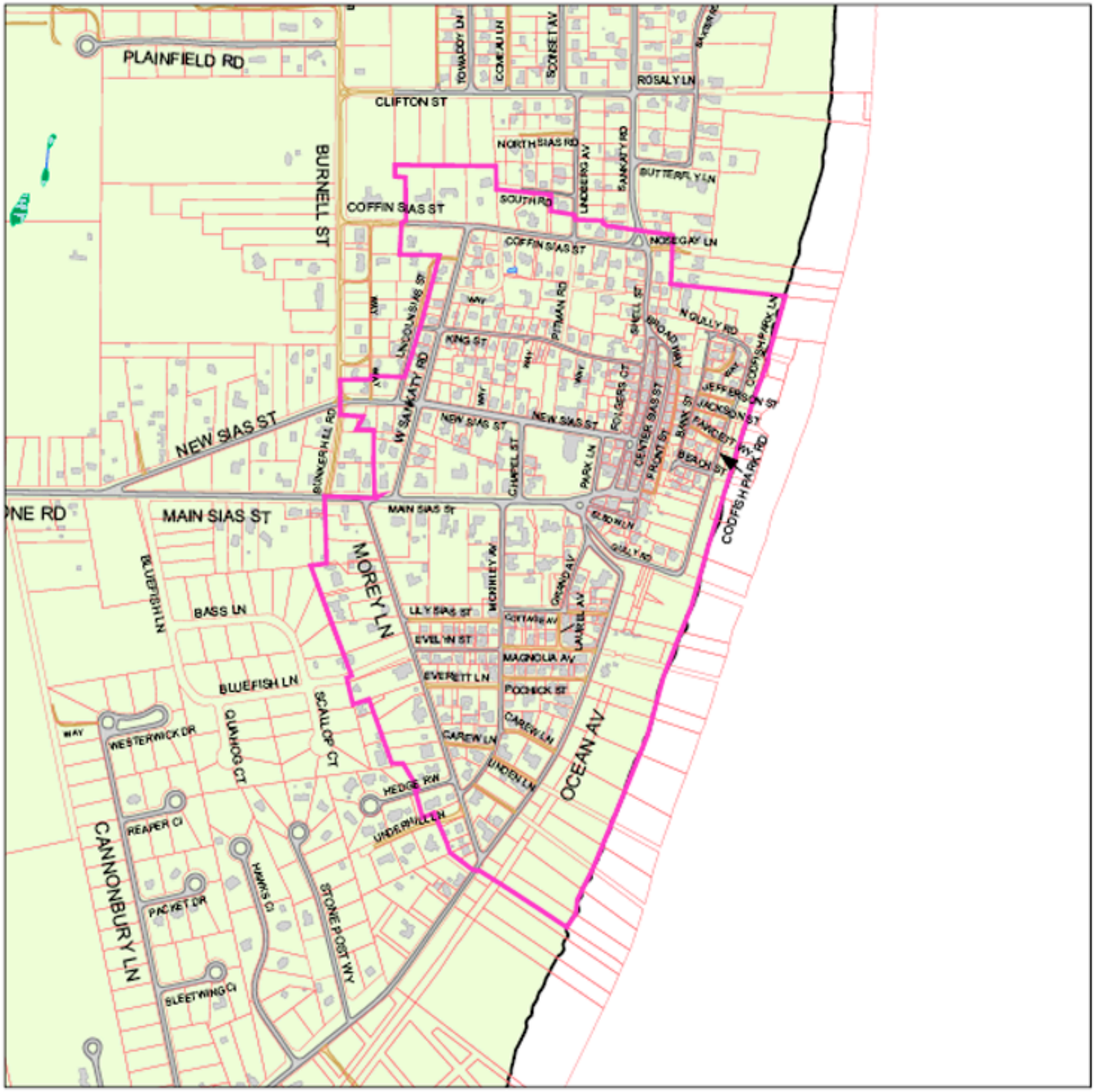
N

Nantucket Historic District Commission
37 Washington Street
Nantucket, MA 02554

508-228-7231

Town of Nantucket
GIS Mapsheet

09/20/2001




# Historic District Commission (HDC)

## Old Historic District

# Siasconset

0 500 1,000 Feet

1 inch equals 500 feet

N

Historic District Commission
37 Washington Street
Nantucket, MA 02554

508-228-7231

Town of Nantucket
GIS Mapsheet

09/20/2001

End Notes:

[1] Sustainable Nantucket. "Greenhouse Gas Emissions Inventory for the Town of Nantucket." http://www. sustainablenantucket.org/documents/GreenhouseGasEmissionsInventoryNANTUCKET_000.pdf (accessed August 13, 2009). 9.

[2] Walter Sedovic and Jill H. Gotthelg, "What Replacement Window's Can't Replace: The Real Cost of Removing Historic Windows," *APT Bulletin* Vol. 36 No. 4. (Jan. 2005): 2.

[3] Richard Moe, "Historic Preservation and Green Building: Finding Common Ground," *Forum Journal* Vol. 23 No. 03 (Spring 2009): 10.

[4] Look, David. "The Preservation Principles of the Secretary of Interior's Standards for Historic Preservation Projects." Power point presentation defining minimal intervention and reversibility.

[5] ABC7 News, Sanders, Hosea and Sylvia Jones. "Store to Help Divert Construction Debris from Landfills," http://abclocal.go.com/wls/story?section=resources/lifestyle_community/green&id=6645498. (accessed June 29, 2009).

[6] Sedovic and Gotthelf, 2-3.

[7] Christopher Lang and Kate Stout, *Building with Nantucket in Mind*. (Nantucket Massachusetts: Nantucket Historic District Commission, 1995), 76. It is generally suggested that new construction in outlying areas can increase this ratio to a maximum of 50%, 113.

[8] John Krigger, and Chris Dorsi,. *The Homeowner's Handbook to Energy Efficiency. (*Saturn Resource Management Inc. 2008): 104.

[9] Ibid.

[10] James, Brad, Andrew Shapiro, Steve Flanders, and Dr. David Hemenway. "Testing the Energy Performance of Wood Windows in a Cold Climate": A Report to The State of Vermont Division for Historic Preservation Agency of Commerce and Community Development, August 30, 1996: 5. The study went on to conclude that "Over the course of the study, it became apparent that replacing an historic window does not necessarily result in greater energy savings than upgrading that same window." 68.

[11] Department of Energy: Weatherstripping http://www.energysavers.gov/your_home/insulation_ airsealing/index.cfm/mytopic=11280 (accessed June 29, 2009).

[12] Brad, Shapiro, Flanders, and Hemenway,. 5.

[13] Christopher Lang and Kate Stout. 156, § 5(c).

[14] Department of Energy Resources Massachusetts Executive Office of Environmental Affairs, "Model As-of-Right Zoning Ordinance or Bylaw: Allowing Use of Wind Energy Facilities," http://www.mass.gov/Eoeea/docs/ doer/gca/gc-model-wind-bylaw-mar-10-2009.pdf. (accessed July 31, 2009). Definition of wind turbine applied to WECS. Pg 3.

[15] The guidelines refer to WECS that are scaled to meet the energy requirements of the property on which they are located, and are not necessarily applicable to systems designed to consistently produce power in excess of those requirements.

[16] Nantucket Massachusetts Zoning Ordinances. Part I, Administrative Legislation, Chapter 139 Zoning, Article IV, § 1399-21 Wind Energy Conversion Systems. http://www.ecode360.com/?custId=NA0948. (accessed August 14, 2009)

[17] National Trust for historic Preservation, http://www.preservationnation.org/issues/sustainability/ (accessed July 31, 2009).

[18] Forest Stewardship Council (FSC) is an independent, non-governmental, not-for-profit organization established to promote the responsible management of the world's forests. http://www.fsc.org/

[19] Michael E. Webber. "Energy versus Water: Solving Both Crisis Together, *Scientific America*. (October 2008). http://www.scientificamerican.com/article.cfm?id=the-future-of-fuel&page=2. (accessed July 31, 2009).